

Remarks

Claims 2, 6-10 and 14-23 are currently pending in the application at the time of the Office Action mailed September 25, 2009. In response to this Office Action, claims 2, 6-8, 10, 14, 15, 17, 19, and 20 have been amended and claims 18 and 21-23 have been cancelled herein.

Claim Rejections -- 35 USC § 103

The Examiner has also rejected claims 2, 6-10 and 14-23 under 35 USC 103(a), as being unpatentable over U.S. Patent No. 5,213,599 to Geertman (Geertman '599) in view of Doremus, "Glass Science, page 102". To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). For the reasons below, Applicant submits that claims 2, 6-10, 14-17, and 19-20 are patentable over Geertman '599 in view of the Doremus reference.

Doremus '599 discloses a method of manufacturing tube glass, wherein a gas or gas mixture which is not chemically reactive at the drawing temperature is introduced into the tube in the direction of drawing where the gas or gas mixture reacts in the tube to form thin surface layers which provide protection of the underlying glass against attack by corrosive atmospheres or alkali and/or alkaline earth ions from the glass are prevented from adversely affecting the life cycle of the manufactured lamps. However, it is admitted that Geertman '599 does not disclose the composition of the glass.

The Examiner utilizes the teachings of the Doremus reference, which teaches the chemical composition of commercial silicate glass to arrive at the conclusion that Geertman '599 utilizes sodium aluminosilicate glass.

Independent claim 2 is directed to a process for the production of an alkaline glass with a modified glass surface. Independent claim 10 is directed to a process for modifying the surface of an alkaline glass with a modified glass surface. Independent claim 17 is directed to a process for the treating of an alkaline glass container with a modified glass surface. Each of independent claims 2, 10, and 17 includes the steps of, among others, contacting the surface of the alkaline glass with an aluminum-chloride compound in a vapor phase, wherein "an aluminum concentration is increased in relation to the volume to provide an aluminum-modified structure in said surface to provide the modified glass surface. In contrast, Geertman '599 discloses the

use of AlCl<sub>3</sub> (see col. 2, line 40) as a reactive gas mixture which are used for depositing layers having an optical or protective function. In essence, the gas mixtures merely result in the deposition of layers on a glass surface, rather than modifying a glass surface as claimed in the present invention. Independent claim 2 of the present invention, the aluminum concentration is increased in relation to the volume of the glass, thereby providing an aluminum modified structure in the glass surface.

Geertman '599 discloses only the deposition of layers having an optical or a protective function at the surface of the glass and is silent regarding the modification of the glass surface (see col. 2, lines. 37-39). Subsequent oxidation of the deposited layers in Geertman '599 results in layers consisting of C, SiO<sub>2</sub>, Al<sub>2</sub>O<sub>3</sub>, SnO<sub>2</sub>, TiO<sub>2</sub>, ZrO<sub>2</sub>, etc. (see col. 2, lines 44-46). Thus, Geertman '599 discloses the formation of a protective layer on the glass surface, wherein the glass surface itself is unaffected. In contrast, the present invention modifies the glass surface by increasing the aluminum concentration in relation to the glass volume resulting in an improvement in the glass itself.

Thus, Applicant submits that independent claims 2, 10 and 17 are novel and not obvious in light of the cited art. Neither Geertman '599 nor the Doremus references, either alone or in combination, disclose avoiding reverse sodium diffusion through the formation of the aluminum modified structure in the modified glass surface. The Applicant submits that dependent claims 6-9, which are dependent upon claim 2, dependent claims 14-16, which are dependent upon claim 10, and dependent claims 19 and 20, which are dependent upon claim 17, are also patentable over the prior art.

#### Claim Rejections -- 35 USC § 112

In the current Office action, claims 2, 6-10 and 14-23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

In response to this rejection, the Applicant has amended claims 17, 19 and 20 and cancelled claims 18 and 21-23 in order to address the “within said glass surface area” limitation.

Furthermore, in response to this rejection, the Applicant has further amended claims 17, 19 and 20 and cancelled claims 18 and 21-23 to address and more clearly define the “aluminum-modified structure” and “glass surface area has an aluminum modified structure” limitations, and that the sodium is bound “in” the structure.

The Applicant has also amended claims 2, 10, and 17 to remove the “contacting volume” limitation. Furthermore, claims 6 and 14 have been amended to more clearly define how the aluminum chloride compound and glass are contacted.

As such, Applicant believes that the rejections under 35 USC §112, first paragraph have been overcome. The Examiner’s careful consideration is respectfully requested.

#### Claim Rejections – 35 USC § 112

In the current Office Action, claims 2, 6-10 and 14-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention.

In response to this rejection, the Applicant has amended claims 2 and 10 to remove the “contacting volume” limitation.

Claim 6 has been amended to more clearly define the invention by providing antecedent basis for “compound(s)”.

Claim 7 has been rejected because it is unclear what the temperatures are. The Applicant directs the Examiner to [0005] of the application where it is written:

“The temperature of the aluminum chloride compounds is between the sublimation temperature of 170 °C and up to 600 K above the transformation temperature of the glass. The duration of the operation of contacting the glasses with aluminum chloride compounds from the gaseous phase is at least 0.1 second at high temperatures and up to an hour at low temperatures. The sample temperature of the glass surface is limited downwardly by the temperature change resistance of the glass. The upper limit can be up to 600 K above the transformation temperature of the glass.”

The transformation temperature of the glass is well known to a person skilled in the art by the sign  $T_g$ . The transformation temperature recites the point of sudden change of thermal expansion of the glass as well known by a person skilled in the art.

The confusing antecedent basis for the “surface” for the dependent claims has been addressed and believed to be clarified.

Claim 8 has been amended to more clearly define the invention by providing antecedent basis for “the temperature”.

Claim 15 has been amended to more clearly define the invention by providing antecedent basis for “the application.”

Claim 18 has been amended to more clearly define the invention by providing antecedent basis for the aluminosilicates.

Regarding the term “thermally induced reverse sodium diffusion”, the Applicant refers the Examiner to [0001] of the present application which states in the Technical Field of the invention that to stabilize the modified glass surface such that the “reverse sodium diffusion out of the volume is substantially avoided even at elevated temperatures.” As further discussed in [00002] of the present application, wherein “but it will be noted that those high reaction temperatures can again result in reverse sodium diffusion out of the volume to the surface. Particularly in the case of later treatment processes such as post-treatment with a flame which is linked to high temperatures, thermally induced reverse sodium diffusion out of the volume can result in a significant worsening in the properties originally achieved.” Thereby, an object of the invention is to stabilize the glass surface through the formation of an aluminum-modified structure in the surface of the glass which has a resistance to thermally induced reverse sodium diffusion as there are effectively no concentration gradients and the sodium is thermally bound in the aluminum modified structure.

Claim 19 has been amended to more clearly define the invention by providing antecedent basis for “said aluminum-modified structure.” Claims 21-23 have been cancelled.

As such, Applicant believes that the rejections under 35 USC §112, second paragraph have been overcome. The Examiner’s careful consideration is respectfully requested.

#### Request for Reconsideration

Applicant believes that all independent claims, including claims 2, 10, and 17, clearly define over the prior art and that the distinctions between the present invention and the prior art would not have been obvious to one of ordinary skill in the art. Additionally, the remaining dependent claims, by the limitations contained in the base independent claims, are felt to be patentable over the prior art by virtue of their dependency from independent claims which distinguish over the prior art of record. All pending claims are thought to be allowable and reconsideration by the Examiner is respectfully requested.

It is respectfully submitted that all references identified by the examiner have been distinguished in a non-obvious way. If the examiner believes that a telephonic conversation would facilitate a resolution of any and/or all of the outstanding issues pending in this application, then such a call is cordially invited at the convenience of the examiner.

Respectfully submitted,

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